Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

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Viewpoint

COVID-19 testing demand amidst Omicron variant surge: Mass hysteria or population health need?

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Dear Editor,

The COVID-19 pandemic continues to disrupt lives and economies around the world. Since the beginning of the pandemic, there have been multiple waves and surges of COVID-19 infections around the world with numerous variants emerging from time to time. Unfortunately, testing for COVID-19 infections has remained at the center of many controversies in the United States and parts of the world (Begley, 2020; Fineout and Sarkissian, 2022). For example, in the light of the rising cases of COVID-19 infections early in the pandemic, the former U.S. President Donald Trump mentioned that too many tests were being conducted which resulted in a lot of cases being reported (Begley, 2020). Such controversial statements were followed by plans to change testing guidelines, caused confusion, and unfortunately, were followed by more such statements from other political leaders or their advisors in the U.S (Begley, 2020; Fineout and Sarkissian, 2022; Freking, 2020; Beals, 2022). On 26 November 2021, the World Health Organization (WHO) identified a new SARS-COV-2 mutant Variant of Concern named Omicron (B.1.1.529) (World Health Organization, 2021). In the first week of 2022, a record number of over one million new COVID-19 cases in a single day were reported in the U.S., and the Omicron variant accounted for the vast majority of new cases (Hong, 2022). Amidst the rising cases of the Omicron variant, the Florida surgeon general called for the 'unwinding of the testing psychology' and that people should stop planning and living lives around COVID-19 testing (Beals, 2022). Other political leaders mentioned that testing and COVID-19 prevention-related hysteria was driving people and their lives. Some medical commentators also asked for people to stop wasting COVID-19 tests and that asymptomatic people were consuming too many tests (Fineout and Sarkissian, 2022; Beals, 2022; Mazer, 2022).

The central assumptions around these controversial statements seem to be that too many tests are causing too many cases, a higher number of cases being reported made certain regions around the world look bad, and that people are living in fear and panic due to testing hysteria (Fineout and Sarkissian, 2022; Freking, 2020; Beals, 2022). Unfortunately, such statements and assumptions may undermine the extent of disease, hinder accurate surveillance of disease, lead to detrimental policies being enacted, and as a result, cause inadequate tracing and isolation of people to prevent rampant community transmission of COVID-19 (Begley, 2020; Hong, 2022; Freking, 2020; Beals, 2022). At-home testing shortages in the U.S have now been widely reported amidst the Omicron variant surge. Also, with the Omicron variant surge, simultaneously rising cases of flu and common cold may also have prompted people to seek testing due to the similarity of symptoms (Beals, 2022; Hong, 2022; Mazer, 2022). Irrespective of these facts and assumptions, to what extent was COVID-19 testing demand a true population health need or a hysterical reaction will be questioned by certain groups. We believe that infodemiological methods can be used to understand population health behaviors and needs and address the aforementioned issues.

As internet search has become a critical source for information, online health information-seeking behavior can also be utilized as a proxy indicator of public health needs during the COVID-19 pandemic. We used infodemiologic methods to analyze trends in online searches among the U.S. public to understand at-home rapid COVID-19 testing demand amidst the surge of the Omicron variant. Using Google Trends (GT), we explored weekly search activities in Google across the U.S related to the Omicron variant and at-home rapid COVID-19 test from 26th November 2021 to 11th January 2022. For each search term, GT provides normalized data in the form of relative search volume (RSV) based on the search popularity scale of 0 (low) to 100 (highly popular). We used a previously described methodological framework by Mavragani et al. for the search strategy, region selection, and time period section in GT (Mavragani and Ochoa, 2019).

In the first set of analyses (Fig. 1A), we found a concomitant increase

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in searches for both the terms (i.e. Omicron variant and at-home COVID-19 tests) with key events. For example, when the first case of the Omicron variant was identified in the U.S. in early December, at-home COVID-19 tests and Omicron variant-related searches surged simultaneously (possibly indicating the beginning of an escalation of cases and demand for testing). Similarly, when the U.S CDC warned about the upcoming Omicron variant wave, the search for the variant and testing increased simultaneously (Preidt and Foster, 2021). Throughout these timelines, there was a consistent increase in daily COVID-19 confirmed cases. We believe that during this time, many people searched for Omicron variant symptoms and believed they could have COVID-19 infection and searched for at-home testing. Interestingly, when the U.S. FDA announced that the at-home rapid antigen tests for COVID-19 could be less sensitive, a sharp drop in the number of searches for COVID-19 at-home tests was observed in google, but the search for Omicron variant symptoms did not decline (US FDA, n.d.). This could indicate that people continued to experience COVID-19 symptoms, but probably didn't believe in at-home testing to the extent they believed in or looked for them earlier. To further delineate the nature and extent of searches on COVID-19 at-home tests and Omicron variant in the U.S., we looked at the top queries related to each of these phrases (Fig. 1 B). The top query related to the Omicron variant was '*Omicron COVID symptoms*' and for at-home testing, it was *'home COVID test near me'*. These searches provide additional credibility to the observation that people had COVID-19 related symptoms and were frantically looking for at-home tests near them. Finally, we also ran a correlation analysis and found a statistically significant positive correlation between Google searches for both Omicron variant and COVID-19 at-home tests (Spearman's rho = 0.891, P = 0.001) (after the CDC warning on Omicron variant infection wave on 15th December 2021).

Our analysis provides robust signals for the expansive surge in COVID-19 symptoms among the U.S. population in December 2021; indicates that the population surge in cases of Omicron variant could have preceded the warnings from the CDC; and that the symptoms may have appeared in communities across the nation even prior to the documentation of a rising number of cases of the Omicron variant (Beals, 2022; Hong, 2022; Preidt and Foster, 2021). Labeling of serious public health needs as 'mass hysteria' or a 'testing psychology' by political leaders does not align with the scientific evidence we have presented (Begley, 2020; Fineout and Sarkissian, 2022; Freking, 2020; Beals, 2022). The general public in the U.S was searching for '*Omicron COVID symptoms'* from late November 2021 onwards and the corresponding rise in search for '*home COVID test near me'* suggests that the people had COVID-19 or COVID-19 like symptoms. Subsequently; both the terms had corresponding increases or decreases in search volumes across time. If there is a doubt that there was a true need for COVID-19 testing; at the most, it could be because the Fall season is also a time in the U.S. for flu and common colds. Individuals may have had symptoms of flu or common cold resembling COVID-19 symptoms which could have triggered the searches for symptoms patterns and demand for COVID-19 testing. Even in such circumstances, seeking testing and searching for Omicron variant symptoms by the public was an appropriate strategy. The CDC also suggested that flu and COVID-19 can have similar symptoms but testing is a must to confirm if a person has COVID-19 infection or both flu and COVID-19 infection at the same time (Centers for Disease Control and Prevention, 2022).

Finally, it is well established that more testing for an infectious disease like COVID-19 may not always mean a higher number of cases (Begley, 2020; Fineout and Sarkissian, 2022; Freking, 2020). Such assumptions should not be driving pandemic policymaking,

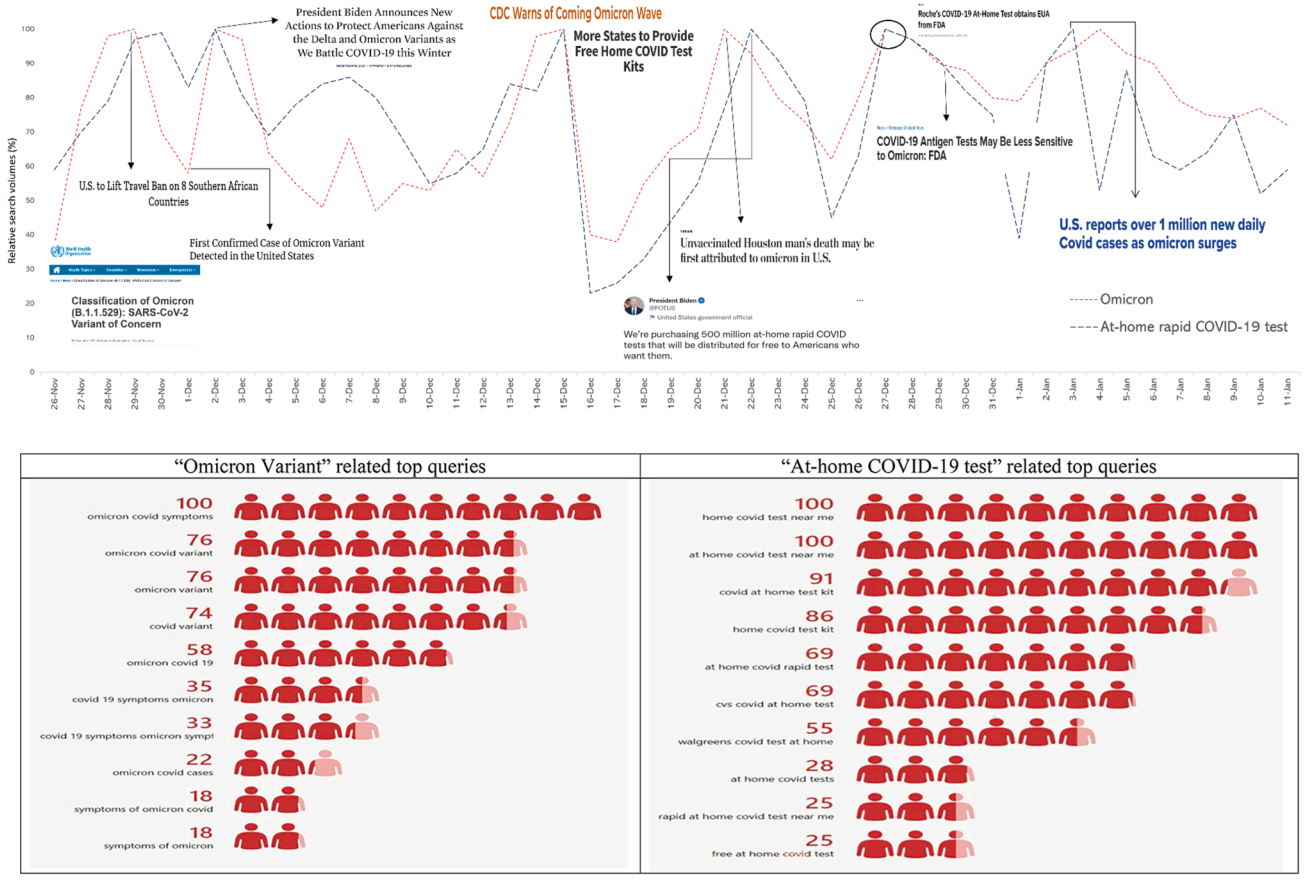

Fig. 1. A & B. Omicron variant and at-home COVID-19 tests search trends (RSVs) and top queries from 26 November' 21 – 11 January' 22. A) "Omicron Variant" related top queries. B) "At-home COVID-19 test" related top queries.

communication, and guidelines. Also, politicians should be mindful of statements made about population health needs, especially with the ongoing and devastating pandemic that has affected the public severely. Instead, political leaders should encourage professional agencies to harness the available technology and data such as the one we used (GT) to understand population health needs and for surveillance of epidemics or infectious disease outbreaks. Our analysis provides very time-sensitive information and such data and analysis can serve as warning signs for impending disease outbreaks and help with planning and prevention purposes.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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